

FEATURES



Andrew Burnett watches as William Collins, visiting researcher at the Gladstone Institute of Cardiovascular Disease, bandages his father Jason's leg after removing a small skin sample for stem cell research in San Francisco, California.

PHOTOS: BLOOMBERG

[ENVIRONMENT]

Canaries in the mine of climate change

With rapidly changing weather patterns, polar peoples find their traditional survival techniques are under threat

BY SHABTAI GOLD
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As a young girl, Elisapee Sheutiapik never wore short-sleeved shirts, but the weather in the summertime in recent years can reach 25°C in her hometown of Iqaluit, close to the Arctic Circle in northern Canada.

Climate change has also impacted the lives of winter hunters from the indigenous Inuit people in Canada.

"Our older hunters, who go out to the land regularly, are sometimes stuck now, and we are conducting more search and rescue missions," said Sheutiapik, the mayor of Iqaluit.

Once, a hunter would cross a frozen river knowing months could pass before it would melt. With rapidly changing weather patterns, hunters find their traditional tools to gauge the depth of snow and ice no longer accurate.

"The changes are happening more quickly and we are not prepared," said Grete Hovelsrud, a senior research fellow at the Center for International Climate Change and Environmental Research in Oslo.

As a social anthropologist, Hovelsrud said she views climate change through the people affected and the communities living near the poles are at the front lines of the new weather patterns.

"The Arctic communities are the canary in the mine," she said in an interview. "The rate of change there is faster and the magnitude of it is greater."

Research conducted by scientists as part of the International Polar Year, which was wrapped up at the UN in Geneva on Wednesday, has shown that snow and ice are declining at both the North and South Poles, contributing to rising sea levels and changes in wildlife, vegetation and weather patterns.

The two years of research, by the International Council for Science and the UN's World Meteorological Organization, at a cost of US\$1.2 billion, "took place during a time when our planet was changing faster than ever in recorded human history, especially in the polar regions," the groups said.

"The new evidence resulting from polar research will strengthen the scientific basis on which we build future actions," Michel Jarraud, the Secretary General of the World Meteorological Organization, said.

Warming in Greenland and the Antarctic is much more widespread than previously thought, the research indicated, in one alarming study.

"Women picking berries say they are noticing new vegetation," said Sheutiapik, adding that bird watchers near the Arctic Circle are also seeing some species migrating farther north than ever before. Fish off Norway's coast are acting in a similar fashion.

In terms of direct health consequences, scientists say the warming is contributing to an increase in tuberculosis cases and infestations of insects, like ticks, into areas that never experienced the creatures before.

The researchers for the International Polar Year have involved indigenous communities from Canada to Russia, not only because they are being heavily affected but also because they have the memories and knowledge scientists need for their studies.

"Arctic residents are involved in monitoring sea life, land life, vegetation," said David Carlson, the director of International Polar Year, noting that they have a "legacy of understanding" that his researchers required.

The networks set up during the field activities have also allowed the scientists to channel information back to the communities so they can better adapt.

For the Inuit people in Northeast Canada, the rising sea levels are apparent and worrying. Traditionally, residents live near the water but now "the shoreline is eroding," said Sheutiapik.

A breakwater built just a decade back is no longer sufficient, as water levels near Iqaluit have risen by close to a meter, which scientists say is a result of the melting and the rising temperatures, causing the ocean waters to expand.

The impact of the warming is also affecting island peoples, who see their land disappearing under the oceans.

Furthermore, the never-before-seen pace of change is already intensifying weather patterns around the world, making events that occurred only once in several years annual incidents and increasing the fury of both storms and droughts.

With the global consequences come global solutions, say International Polar Year scientists. While some areas may become drier and less suitable for agriculture, other areas, such as Finland, may be able to grow fruits and vegetables that would not have survived just several years ago in the frigid regions.

Adaptation, warned Hovelsrud, would still not remove the need to take immediate steps to stop the heating of the planet.

"The message is adaptation is inevitable, mitigation is absolutely necessary," she said.

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Is the ethical battle over destroying embryos over?

Experts in Britain and Canada have found a way to make stem cells without destroying embryos. The find could hail the advent of regenerative medicine by using a patient's own cells, which would prevent the risk of rejection

BY IAN SAMPLE
THE GUARDIAN, LONDON

Scientists have found a way to make an almost limitless supply of stem cells that could safely be used in patients while avoiding the ethical dilemma of destroying embryos.

In a breakthrough that could have huge implications, British and Canadian scientists have found a way of reprogramming skin cells taken from adults, effectively winding the clock back on the cells until they were in an embryonic form.

The work has been hailed as a major step forward by scientists and welcomed by pro-life organizations, who called on researchers to halt other experiments that use stem cells collected from embryos made at IVF clinics.

Ian Wilmut, who led the team that cloned Dolly the Sheep and heads the UK's Medical Research Council Center for Regenerative Medicine at Edinburgh University where the work was done, said: "This is a significant step in the right direction. The team has made great progress and combining this work with that of other scientists working on stem cell differentiation, there is hope that the promise of regenerative medicine could soon be met."

Stem cells have the potential to be turned into any tissue in the body, an ability that has led researchers to believe they could be used to make "spare parts" to replace diseased and damaged organs and treat conditions as diverse as Parkinson's disease, diabetes and spinal cord injury.

Because the cells can be made from a patient's own skin, they carry the same DNA and so could be used without a risk of being rejected by the immune system.

Scientists showed they could make stem cells from adult cells more than a year ago, but the cells could never be used in patients because the procedure involved injecting viruses that could cause cancer.

In 2007, researchers in Japan and America announced they had turned adult skin cells into stem cells by injecting them with a virus carrying four extra genes.

Now, scientists at the universities of Edinburgh and Toronto have found another method, making so-called induced pluripotent stem (iPS) cell therapies a realistic prospect for the first time.

In two papers published in the journal *Nature*, Keisuke Kaji in Edinburgh and Andras Nagy in Toronto describe how they reprogrammed cells using a safer technique called electroporation.

This allowed the scientists to do away with viruses and ferry genes into the cells through pores.

Once the genes had done their job, the scientists removed them, leaving the cells healthy and intact. Tests on stem cells made from human and mouse cells showed they behaved in the same as

embryonic stem cells.

"I was very excited when I found stem cell-like cells in my culture dishes. Nobody, including me, thought it was really possible," said Kaji. "It is a step towards the practical use of reprogrammed cells in medicine, perhaps even eliminating the need for human embryos as a source of stem cells."

Nagy said: "We hope that these stem cells will form the basis for treatment for many diseases and conditions that are currently considered incurable. We have found a highly efficient and safe way to create new cells for the human body which avoids the challenge of immune rejection."

Josephine Quintavalle from the lobby group Comment on Reproductive Ethics, which opposes embryonic stem cell research, said: "I don't think people are going to waste time on embryonic stem cells any more. Half of Europe is opposed to embryonic stem cell research. This is definitely a very, very promising way forward and a very promising solution to the embryonic stem cell battle."

It would be some time before the cells could be used in patients, Wilmut said, because scientists had yet to find reliable ways of making different tissues from stem cells.

The science of stem cells

Why are stem cells so useful?

They are the building blocks of our bodies. They can grow into any of the tissues that make us up, including bone, muscle, skin, brain cells, heart cells and those in our organs. If scientists can harness their potential, they could find new ways to study diseases and even make "spare parts" to replace damaged tissues.

Why are they so controversial?

Scientists get embryonic stem cells from spare embryos created at IVF clinics. Pro-life organizations object because they are destroyed in the process.

How have scientists overcome the problem?

Scientists no longer need embryos. Instead, they take adult skin cells and add genes that convert them into "induced pluripotency stem cells," or iPS cells, which behave the same way as embryonic stem cells.

Is it safe?

The first so-called iPS cells were made by injecting viruses into adult cells. It would be too dangerous to use these in patients. The latest research does away with viruses, making the cells much safer.

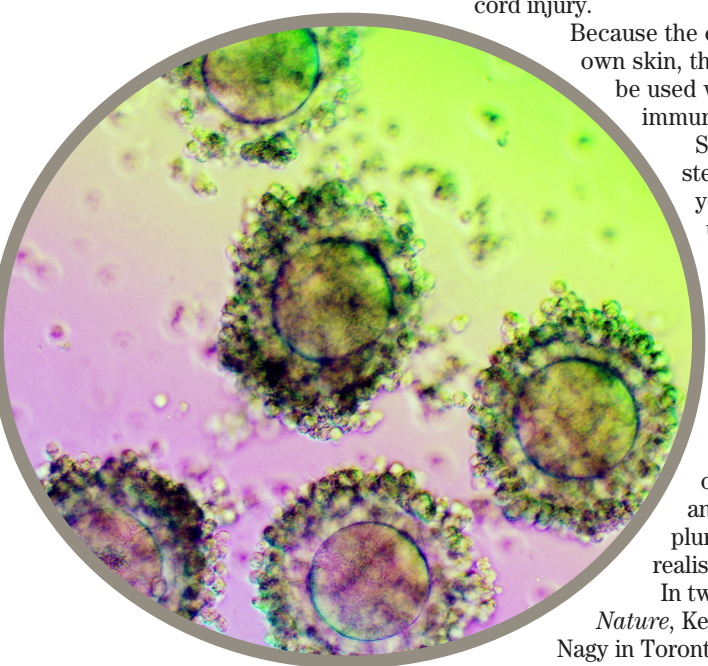
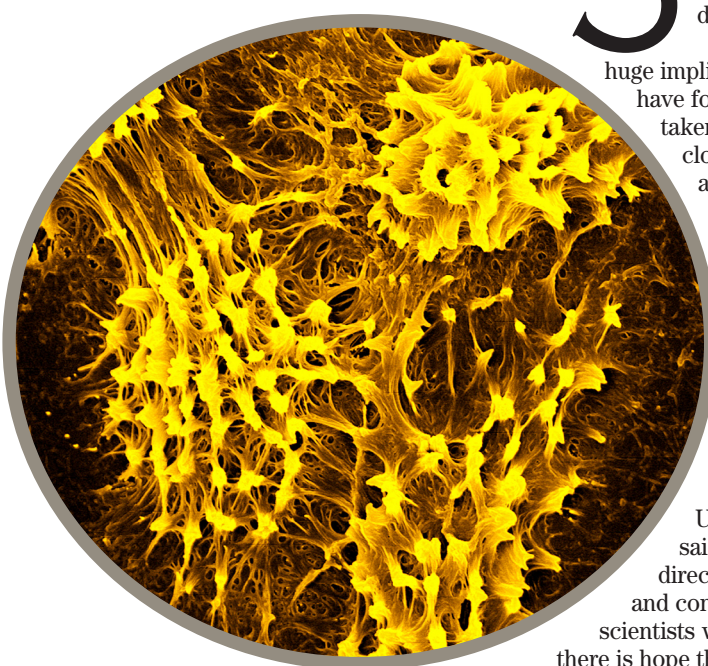
When will they be used?

Scientists must overcome two major hurdles before the new cells can be used in patients. First, they must work out reliable ways of turning stem cells into different tissues. Second, the cells must pass rigorous safety checks to prove they will not harm patients, for example by growing out of control and causing cancer.

Is this the end of using embryos?

Most scientists believe it would be short-sighted to give up research on stem cells taken from embryos. Embryo-derived stem cells are still the most versatile and seem to work best, and the new technique has not been around long enough to be certain it will work.

SOURCE: THE GUARDIAN



A mother polar bear rests on the frozen tundra with her cubs waiting for the Hudson Bay to freeze over in Churchill, Manitoba, Canada. The animals are not the only victims of climate change.

PHOTO: AFP